ANSWERS TO CORRESPONDENTS

C. S. A. can improve his rancid butter by the process described on p. 368, vol. 26.—J. P. W.'s correction to the problem on p. 11, vol. 30, has been anticipated.—W. W. will find directions for making earthenware and porcelain on p. 3, vol. 30.—C. H. C. will find recipes for yellow and blue lights on p. 58, vol. 30.—For answers to your other queries, consult the booksellers who advertise in our columns.—J. W. C. should address the makers of emery wheels.—S. D. L.'s answer to the ship and cannon problem is correct.—C. P. B. Jr.'s query is incomprehensible.—L. G. G. will find directions for transferring engravings on p. 138, vol. 30.—G. M. H. will find a description of the preparation of platinum sponge on p. 330, vol. 25.

J. W. H. asks: 1. Can a paper pulp be used instead of several layers of paper in making images for the stage? A. Probably it could. 2. How can I make the pulp? A. Old paper may be made into a pulp with a solution of lime and gum or starch, pressed into the form required, coated with linseed oil, and baked at a high temperature.

J. M. says: I have a boiler 42 inch by 20 feet; it is two years old and there are two holes eaten in it by rust, right over the fire; they are eaten from the inside. What can I do to prevent rust doing any more damage? A. If the corrosion be caused by scale, change the feed water, or use some substance that will prevent the formation of scale.

W. L. N. says: I find that all matter that makes scale in a boiler is at one time a floating scum on the water, till, by attracting more particles, it becomes heavy and precipitates to the bottom. I propose to take that scum from the boiler while in the fluid state. Is the idea a good one? A. It is not a fact that the principal incrustations in a boiler are caused by substances that float on the water as a scum.

D. C. asks: 1. What will be the approximate velocity of steam at 200 lbs., flowing into another body of steam at a pressure of 100 lbs. through a pipe 3 square inches in area and 3 inches in length? What would it be under the same conditions if discharged into steam of 50 lbs.? Would not the work performed by the steam on entering the respective pressures be about equal? Will Professor Rankine's formulas, given on p. 113 of your volume 29, apply to these cases? A. The rules given in the article referred to are as accurate as any that have been deduced. 2. Would a polished plate with no uneven surfaces encounter much loss of power if revolving rapidly in steam at a high pressure? A. No. 3. How is it that steam will expand to twice its volume and half its pressure when the heat of one volume with a pressure of 2 is not equal to that of 2 volumes with a pressure of 1? A. The law that the volume is inversely as the pressure is only true of a perfect gas whose temperature is maintained constant during the expansion.

A. B. says: 1. It is stated that daguerreotypes may be made by the electrotype process. Can a printed page of a book be made in a similar way? A. Electrotype copies of daguerreotypes can be made. 2. It is said that a sheet of paper folded into two leaves is called a folio, into four leaves a quarto, etc. What is the size of the sheet so folded? A. It differs greatly, being elephant folio, demy folio, etc. 3. Is magneto-electricity the same in kind as the electricity produced by any of the numerous forms of the galvanic battery, such as Grove's or Bunsen's? A. The electricities obtained from magneto-electric machines and batteries have similar heating, lighting, and electrolytic powers, but differ greatly in quantity and intensity.

H. J. B. asks for a recipe for plating small articles of silver without a battery. A. The metallic surface intended to be silvered, having been well cleaned, is rubbed, by means of a smooth cork, with a with a mixture of 1 oz. chloride of silver, 1 oz. common salt, ½ oz. chalk, and 3 oz. carbonate of potash, made with water in to a creamy paste.

R. J. asks: 1. What are the proper proportions of salt and ice to freeze ice cream? A. Twice as much pounded ice as rock salt, but the proportions may be changed somewhat without destroying the efficiency of the mixture. 2. For keeping ice, which is best, dry or wet sawdust? A. Dry saw dust. 3. I have a large amount of charcoal and ashes, being the *debris* from a furnace. Will it be of more value as a fertilizer, or as an underlying bed for an ice house? A. It depends upon circumstances; but ordinary coal ashes and charcoal not being remarkable fertilizers, you might better use in the way indicated.

A. B. C. asks: 1. What is shown by chemical analysis to be the composition of coal? A. The Pennsylvania anthracites consist of 1·34 per cent water, 3·84 per cent hydrocarbons, 87·45 per cent carbon, 7·37 ash. The percentages of these constituents vary greatly, the bituminous coals having more hydrocarbons and volatile combustible matter with less fixed carbon. 2. Is fire or flame a material thing? A. The flame of a candle or gas burner is composed of gaseous matter in a state of ignition. This gaseous matter, generally speaking, consists of various compounds of carbon and hydrogen. By carefully looking at a flame, it will be found to consist of three parts: the lowest of a bluish color, where the hydrogen is uniting with the oxygen of the air. The heat given out by their chemical union is very great, and raises the particles of carbon to white heat. These white hot particles give out the light. Around these is a thin shell of carbonic acid, and the spent gases arising from the combustion.

C. M. F. asks: 1. Has the use of the microscope any injurious effect on the eye? If so, how can I avoid it? A. It has when frequent intervals of rest are not permitted to the eyes, or when the observations are prolonged for several hours at a time. A little practice will enable the observer to keep both eyes open, while looking through the eye piece with one eye, and at the same time see as distinctly as if the other eye were closed with the hand. This, and using the left and right eye alternately, afford great relief. 2. Is there any way of throwing the light upon an opaque object under the microscope, other than the lens? A. By means of a Lieberkuhn, which is a highly polished speculum of silver, and reflects the light down upon the surface of the opaque object. 3. Will the use of the lens injure the eye, and why? Will the use of the mirror by lamp light injure the eye? A. Used properly, with a lamp which does not flicker, in such a way as to get a good illumination without either blinding the eye with its intensity, or taxing it by too long an observation: both the lens and mirror can be used without any injury. 4. If I should replace the three smallest lenses of a microscope by three others of higher powers, would it answer the same as a higher priced instrument, without altering the other parts? A. It would answer the same purpose, provided the other parts would give a corresponding delicacy of adjustment of the focus and of the stage.

C. R. M. asks: 1. Where is carbon black diamond found? A. In Brazil. 2. Could arsenic be substituted for Paris green in the poisoning of potato bugs? A. Arsenic is equally or more poisonous, but experiment would tell whether the bug would as readily eat a white powder as one which is of the same color as the leaf.

C. F. D. asks: Is there anything which will cement broken coral? A. Apply powdered sandarac or mastic with a small brush, heat until it melts, and press the broken pieces together. Or mix boiled linseed oil and red lead; and after applying, let it harden quietly for some weeks.

J. D. W. asks: 1. Is there an easy method of extracting pure hydrogen from house gas? A. Large quantities of pure hydrogen can be easily and simply made from other materials, but from house gas its extraction is difficult. 2. How can I get more pressure on house gas as it comes from the burner? A. The plan usually followed is to receive the gas from the mains in a small gas holder, and connect this with the burners. 3. What causes it to explode? Is it dangerous to handle 15 or 20 gallons at a time? A. Mixture with air. When the air is prevented from mixing with the gas there is no more danger than in handling gun powder or other explosive.

H. J. B. says: I have made an explosive powder composed of 2 ozs. chlorate of potash, 1 oz. prussiate of potash, and 1 oz. white sugar, which has 3 times the force of common gunpowder. Is it dangerous? A. This powder has been known since 1849. It has the following advantages. It can always be obtained of uniform strength and quality, by weighing out the proper quantities of each ingredient. It does not attract moisture and is not acted upon by exposure to the air. The manufacture requires but a short time, the projectile force is far greater, and the powder need not be granulated. Its disadvantages are that it is more readily fired than ordinary gunpowder, therefore more dangerous, that its manufacture is very expensive, and that during its ignition it acts so very strongly upon iron and steel that it can only be used in bronze ordnance, and in the fillings of shells, etc.

B. F. C. says: In your pamphlet containing the United States patent law and other information, you give a recipe for making liquid glue which is as follows: "Dissolve gum shellac 3 parts, and caoutchouc 1 part, in separate vessels, in ether free from alcohol, applying a gentle heat. When thoroughly dissolved, mix the two solutions." I have tried to make some of this glue, and could not make the rubber dissolve. I had no trouble with the gum. Do you think the fault was in the ether? What kind of rubber is required? Will an old car spring do? A. Use rectified sulphuric ether that has been washed to remove alcohol and acidity, and india rubber that has not been vulcanized. When the caoutchouc has become well softened by the ether, break it up into small pieces and stir well until a homogeneous soft mass is obtained. It will be as well to cut the rubber into small pieces before pouring the ether on them, but the mass must be frequently and well stirred. Pour the solution of shellac into that of the rubber, and incorporate them thoroughly by stirring.

D. E. asks: In your issue of January 10, 1874, a correspondent gives a problem with a diagram. From his statement I infer that the annular space, 4·4 is airtight. This being the case, how is it possible for either piston to fall, even though the balance of the cylinder 5 contains only air and not a denser fluid? A. Under this supposition, it is impossible for motion to take place.

S. asks: Is there a simple and easy method of extracting perfume from flowers, etc.? A. Yes. The fresh flowers are placed between layers of cotton wool, saturated with sweet olive oil; in some cases, pure lard is employed. The essential oil thus obtained is separated from the sweet oil by agitation with strong and highly rectified alcohol. The essential oils of jasmin, sweet violets, hyacinths, etc., are obtained in this manner The perfumed extract is then prepared from the essential oil by dissolving it in very pure alcohol; and in order to blend the mixture and render it mellow, it is kept several months in a bottle before being sold. This also answers A.

M. B. C. says: I have a building of frame, 70 feet long, 33 feet wide, 2 stories high: the second story is used for drying stock. It is lined and ceiled with hemlock floor boards, and heated by steam, with 8 rows of 1 inch pipe extending across one end and 48 feet along each side, making about 1,000 feet of pipe. I desire to have my stock dry faster; can I accomplish this by making an opening in the floor of about 144 square inches, connecting with a wooden chimney at end of building 12 inches square and extending 3 feet above the roof? Would it be practicable to box in about 48 feet in length of the pipe along one side for heating the air as it comes in? And would there be any draft inwards by admitting air from outside, by an opening at one end? Or must I run a tube down to the bottom of next room to secure a draft? Will such an arrangement supply the room with sufficient warm dry air, and also relieve it of the damp air by the first named arrangement in the floor connecting with the wooden chimney? A. There is a popular fallacy in connection with this subject of drying by heated air, that needs correction. It is supposed generally that to dry anything we have only to confine air in a close room and then heat it to a certain temperature, and keep it so for an indefinite length of time. The true theory is as follows, and the best success is assured when our practice accords with it: Air has the greatest capacity for absorbing water when expanded by heat of the sun or otherwise; but when saturated, is incapable of further absorption. When it has the appearance of being the most dry, it is then much charged with water, and is still absorbing water from everything it touches; when it has, on the contrary, the appearance of being very wet and humid, it is not much charged with water and is giving off that which it has. In regard to this case, it is evident that by charging the air in the room with caloric, we prepare it for the absorption of water, and so cause it to have a drying power upon the stock; but when it is fully saturated with the water it has taken up, its drying power is overcome and its action is passive. It, however, we drive this air out of the room and take in fresh air, we can again expand it with heat, and again give it a drying power equal to its capacity for the absorption of water; and thus proceed more rapidly with the operation of drying the stock. Instead, however, of having a continuous current passing through the drying room, it will answer as well to periodically open all the windows for a short time, and let the air be totally changed in the room; then close them, heat up again, and keep them closed for a period sufficient to fully saturate the air with water. This might be determined by the feeling of dryness or humidity which the air presents, not opening the windows until the air appears very damp; and a few trials would soon determine the length of time best to work with one volume of air.

D. C. B. asks: 1. Can you give me recipes for making transparent colors? A. It will be cheaper and more satisfactory for you to buy them. 2. How can I make a good transparent varnish for brasswork? A. With copal and alcohol.

W. D. asks: Where is the deepest artesian well in the world? What is its depth? A. The deepest artesian well of which we have seen an account is at Louisville, Kentucky. Its depth is 2,086 feet.

G. asks: 1. How shall I construct a fire escape, suitable for a lady traveling? A. Try your inventive skill. 2. How shall I draw an oval? A. See p. 299 vol. 29.

T. & H. ask: How can we make a joint in a brass pipe, so that it can be bent in any direction? We have been told of a knuckle joint, but no one knows what it is. A. The joint consists of a ball and socket, the latter being something more than a hemisphere.

G. L. H. asks: How can I construct a rain gage? How can I tell the amount of evaporation? A. The rain gage ordinarily used consists of a cylindrical vessel having a funnel-shaped cover, in which there is a very small hole. A glass tube connected to the bottom of the vessel shows the hight of water. In accurate operations, it is customary to ascertain the evaporation daily, usually in a separate vessel.

J. McJ. asks: Is a house properly rodded for conducting off lightning, where the rod is fastened to the finials of the roof by means of copper wire not insulated? A. It is correct to attach the rod directly to the roof or building without insulators. But no building can be said to be properly rodded or protected against lightning, unless the lower part of the rod or terminal under the ground is made quite extensive. The extremity of the rod should connect with masses of old iron, or iron ore, or coke, or charcoal, laid in trenches, or the rod itself should be elongated and carried off one hundred or more feet from the building, and put in connection with water, if possible. The particular method of attaching the rod to the building, whether with or without insulators, is of far less importance than the terminal arrangements of the rod. The golden rule for safety is: "Provide the largest possible area of conducting surface for the terminal of the rod."

C. W. C. asks: 1. How can I make the best black writing ink? A. What is the best black ink is probably a matter of opinion; but you will find a good recipe on p. 203, vol. 29. 2. How can I make red ink? A. Dissolve pure carmine in caustic ammonia. 3. How can I estimate the horse power of a boiler? A. The term "horse power of a boiler" is so indefinite that we cannot give you any good rule.

G. H. B. asks: Is rolled sheet zinc pure metal? If composition, what are the proportions and ingredients? A. It ordinarily contains small quantities of lead and iron, a little tin and cadmium, and sometimes traces of arsenic, copper, carbon, and sulphur.

J. L. H. asks: 1. How can I readily tin iron rods ½ inch square and from 12 to 18 inches long? A. Cover the rods with muriate of zinc, and put them into a tin bath. 2. What is the process of electroplating, access being had to a telegraph battery? A. You should consult some standard work on the subject, as we have not space for the details in these columns.

M. W. B. asks: What causes the light and dark stripes on a ceiling, the light stripes corresponding with the laths and joists, and the dark stripes with the space between? A. The moisture in the wood.